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THE PROSOPIDIDÆ OF SOUTHERN MAINE.

By John H. Lovell.

Waldoboro, Maine.

The various species of Prosopis indigenous to southern Maine have been collected from June 16 to August 25. Of the eight local species enumerated in this paper only P. *pygmæa* and *P. modesta* are common, while *P. variifrons*, *verticalis* and *basalis* are very rare. Specimens of these bees have been taken most frequently on the flowers of *Aralia hispida* and the garden blackberry (*Rubus villosus*), to both of which they are common visitors. They are also often found on the inflorescence of the golden-rods, and less frequently on many other blossoms. The local species may be separated by means of the following key:

FEMALES.

Entirely black, a large species, 9 mm..... **basalis.**
Black with yellow marks.....1.
1. Collar black or unspotted.....2.
Collar with two yellow spots.....4.
2. Face-marks subtriangular, yellow spots on tubercles, and often tegulæ, 4-5 mm..... **pygmaea.**
Face-marks narrow, tubercles and tegulæ dark, 4-5 mm..... **saniculae.**
Face-marks bow-shaped, larger size, 6 mm.....3.
3. A transverse mark on clypeus, tegulæ spotted, marks nearly white.. **variifrons.**
A transverse mark on clypeus, tegulæ dark, marks pale yellow..... **elliptica.**
Clypeus wholly black, tegulæ usually dark, marks yellow..... **verticalis.**
4. A yellow spot on base of costal nervure and on each tegula..... **ziziae.**
Base of costal nervure, or wing base, without a yellow spot, tegulæ usually dark..... **modesta.**

MALES.

Collar wholly black.....1.
Collar with two yellow stripes or spots.....5.

1. Scape dilated, larger size.....2.
   Scape not dilated, smaller size.....4.
2. Scape broader than long, cordate, concave beneath, the frontal half yellow, tubercles dark, 7 mm.....**basalis.**
   Scape longer than broad.....3.
3. Scape triangular in form with a yellowish white spot in front, the upward extensions of lateral face-marks obliquely truncated the inner angle prolonged to a point above the insertion of antennæ..**variifrons.** (*antennata*).
   Scape obconical, black, upward extensions of lateral face-marks diverging from the eye-orbit, and ending on a smooth, shining, rounded space above the insertion of antennæ.....**verticalis.**
4. Face below sockets of antennæ lemon yellow, upward extensions of lateral face-marks diverging from eye-orbit and club-shaped or rounded at apex, 4-5 mm.....**pygmaea.**
   Four separate marks upon face, a subquadrate spot on clypeus, a smaller one on supra-clypeal piece, and a stripe on each side, 4-5 mm.....**saniculae.**
5. Scape arcuate, a yellow spot on base of costal nervure and on each tegula, upward extensions of lateral face-marks truncate.....**ziziae.**
   Scape normal, unspotted, base of costal nervure or wing-base without a yellow spot, upward extensions of lateral face-marks obtusely pointed.....**modesta.**

Prosopis pygmaea Cr.

1869. *Prosopis pygmæa* Cr. (not Schenck), ♂, Pr. Bost. Soc. Nat. Hist. 12:272.
1896. *Prosopis pygmæa* Robt. ♀ ♂, Can. Ent. 28:137.
1901. *Prosopis pygmæa* Lov. ♀ ♂, Ent. News, 12:5.
1907. *Prosopis cressoni* Ckll. Ann. Mag. Nat. Hist. ser. 7, 20:131.

Specimens of the female were collected on the garden blackberry, June 19–25; Solidago, August 19–September 8; Aralia hispida, July 15; of the male on the garden blackberry, June 19–21; Solidago, August 9–25. A common and widely distributed species, reported also from Connecticut, Indiana, Illinois, and Colorado. At Falls Church, Va., it has been taken May 30 on chinquapin, and July 6 on Ceanothus by Dr. Nathan Banks. As the European *P. pygmæa* Schenck, according to Dalla Torre, is a synonym of *P. brevicornis* (Nyl.) Schenck, the long established specific name given by Cresson has been retained.

Variations in the yellow marks are common; in the female there is usually a spot on each tegula but it may be absent, occasionally there is a spot on the clypeus, the lateral face-marks may be reduced to a stripe or a spot, while in one male the tubercles

are dark. In the male the 1st abdominal segment may be nearly impunctate, or sparsely and finely punctured. In this species as well as in *P. ziziæ*, *P. modesta* and other forms mounted specimens sometimes have the marks red. At first I supposed that this was a natural variation in color, but I have recently ascertained experimentally that this change is caused by leaving the specimens for too long a time in the cyanide jar. When a number of wasps belonging to the genus Vespa were left in the cyanide jar for some weeks, on examination the yellow marks were found to have all changed to bright red. Specimens of *P. modesta* with yellow marks were then exposed to the action of cyanide of potassium, and in a few days they became red. Even dried specimens were similarly effected. It is important that this artificial change of coloration should be generally known since it might easily lead to erroneous conclusions.

Prosopis saniculae Robt.

1896. *Prosopis saniculæ* Robt. ♀ ♂, Can. Ent. 28:137.
1901. *Prosopis saniculæ* Lov. ♀, Ent. News, 12:5.

Three females taken on *Aralia hispida*, July 15–16. I have a male from Point Abbaye, Mich., collected by Morgan Hebard, July 24, 1903, for which I am indebted to Mr. H. L. Viereck.

Prosopis affinis Sm.

1853. *Prosopis affinis* Sm. ♀ (not ♂), Cat. Hym. Brit. Mus. 1:24.

Many attempts have been made to identify *P. affinis* Sm., none of which appear to have been correct. Fortunately the types are still preserved in the British Museum, and through the kindness of Col. C. T. Bingham I have obtained new descriptions of both sexes accompanied by very excellent figures. The description of the female is as follows:

"♀.—Black. Head: the sides of the face with a triangular yellow patch extending from the level of the base of the mandibles to a little above the level of the insertion of the antennæ; antennæ castaneous brown. Thorax: a medially interrupted line on the pronotum, the tubercles and a spot in front of the tegulæ yellow; wings hyaline and iridescent, tegulæ, stigma and nervures castaneous brown, the nervures of a paler tint than the tegulæ or stigma; legs castaneous brown, the coxæ black, the basal half of the tibiæ of the anterior and posterior legs and the basal third of the tibiæ of the intermediate legs yellow. Abdomen: the apical margins of the segments 1-5, obscurely castaneous. Head about as broad as the thorax, trans-

verse, more than twice as broad as long, very closely, finely and evenly granulate; mandibles coarsely rugose in the middle on the outer side; clypeus trapezoidal, much longer than broad and about half the width at its posterior margin from what it is at apex; space between the base of the mandibles and the eyes very short; the eyes narrow and elongate, the cheeks behind the eyes not much developed; front between the base of the antennæ triangularly raised, the surface flat; antennæ short and robust, the basal two or three joints of the flagellum moniliform; the ocelli in a shallow arch on the vertex. Thorax, closely, finely and evenly granulate, broadly oval; pronotum transverse very narrow; mesonotum with longitudinal parallel short impressed lines; scutellum crescentic; median segment short roundly and obliquely truncate, the triangular area at base coarsely longitudinally rugose; pro-, meso- and metapleuræ rather flat. Abdomen: comparatively massive, smooth, the basal segment with very sparse minute punctures, posterior segments with scattered erect hairs. Length of ♀ 6 mm.; expanse 11 mm. The labels on the specimens bear no precise locality— simply "U. S. America.' "

The more important characters in which the female of *P. affinis* Sm. differs from the female of *P. ziziæ* Robt., which was formerly identified as Smith's species, are the much broader head and the absence of a yellow spot on the base of the costal nervure. They also appear to differ in distribution. Smith described three species of Prosopis from North America: *P. basalis* was from Hudson's Bay and was collected by G. Barnston; *P. confluens* was from St. John's Bluff, East Florida, and was collected by E. Doubleday; while the label of *P. affinis* gives only "U. S. America" as the locality, the British Museum Catalogue gives the locality as "Hab. North America, (E. Doubleday, Esq.)," from which it may be inferred with much probability that it was collected in East Florida in the same locality as *P. confluens*. If this supposition is correct, then we may have been looking for *P. affinis* in a part of the country in which it does not occur. The characters and distribution of *P. ziziæ*, therefore, appear to differentiate it from *P. affinis*, though undoubtedly the species are closely allied.

Prosopis binghami sp. nov.

1853. *Prosopis affinis* Sm. ♂ (not ♀), Cat. Hym. Brit. Mus. 1:24.

The male assigned to *P. affinis* evidently does not belong to it, but is a distinct species. After a careful comparison of the male and female types Colonel Bingham writes under date of November 5, 1907, "I am disposed to agree with you that ♂ and ♀ *P. affinis* Smith belong to distinct forms." I take great pleasure in dedicat-

ing this species to Colonel Bingham in acknowledgment of his kindness in redescribing and figuring Smith's types.

"♂. Differs from the female (*P. affinis* which Smith regarded as the female of this bee.—J. H. L.) conspicuously in color of the abdomen, which is exactly the color of a peeled horse-chestnut, in the more slender shape of the body and in the head and thorax being clothed somewhat thickly with short, erect, whitish hairs. The more minute differences in color and sculpture are as follows: Clypeus and the raised triangular area above it, the tibiæ of the fore- and the tarsi of all the legs, yellow; the pronotum without the yellow transverse line above. Head slightly wider than the thorax not so long as in the female; antennæ proportionately longer, the basal joints of the flagellum not markedly moniliform. Thorax: the mesonotum without the impressed lines, the triangular space at base of the median segment very closely and coarsely punctured, not longitudinally rugose as in the female. Abdomen: basal segment with more minute and scattered punctures and on its basal half somewhat thickly covered with erect hairs. Length 6 mm.; expanse 10 mm."

For the two excellent figures of Smith's types illustrating this paper I am indebted to Colonel Bingham. Fig. 1. represents the female of *P. affinis*, and Fig. 2 the form wrongly supposed by Smith to be the male of this species, to which I have given the name *P. binghami.*

Prosopis ziziae Robt.

1896. *Prosopis affinis* Robt. (not Smith), ♀ ♂, Can. Ent. 28:136.
1896. *Prosopis ziziæ* Robt. Can. Ent. 28:136. (Proposed as an alternative name.)
1898. *Prosopis ziziæ* Ckll. ♂, Ent. 31:187.
1901. *Prosopis affinis* Lov. ♀ ♂, Ent. News, 12:6.
1904. *Prosopis ziziæ* Robt. ♀ ♂, Can. Ent. 36:274.

This species occurs throughout the northeastern states, and I have before me specimens of both sexes taken at Falls Church, Va., by Dr. Nathan Banks. I am not aware that it has ever been reported from Colorado, New Mexico, or the extreme southern states. It is not a common species in this locality. The female has been collected on the garden blackberry, June 24–25; Solidago, August 9–20; male on the garden blackberry, June 24; and Solidago, August 9–21. This species has been repeatedly identified as *P. affinis* Sm., but as has already been shown the two forms not improbably occupy different areas.

Prosopis modesta Say

1837. *Hylæus modestus* Say, ♀ (not ♂), Bost. Jour, Nat. His. 1:392.
1859. *Hylæus modestus* Lec. ed. Say's Writ. 2:771.
1869. *Prosopis affinis* Cr. ♀ ♂, Pr. Bost. Soc. Nat. Hist. 12:270.
1882. *Prosopis affinis* Prov. ♀ ♂, Faun. ent. Can. Hym. p. 727.
1901. *Prosopis modesta* Lov. ♀ ♂, Ent. News, 12:5.

Say's description of *P. modesta* is so brief and indefinite that the correct determination of the species has long been regarded as problematical. Unfortunately the types are no longer in existence. But the name has been so widely used that to reject the species as indeterminable is open to serious objection, since it will long linger on in lists and synonomies and continue to prove a source of error. The elimination of *P. affinis* Sm., greatly simplifies the problem, as it was with this species that *P. modesta* was most frequently confused.

In 1825, Say left Philadelphia, his native city, and joined William Maclure's community at New Harmony, in Indiana, where he remained until his death in 1834. His description of "*Hylæus modestus*" was published in 1837, so that it is probable that his specimens were collected in Indiana; and that, as he described only one species, they were common forms. Some years ago Mr. R. J. Weith collected for me at Elkhart, Indiana, a large number of bees, among which were three species of Prosopis: two of these were *P. pygmæa*, and *P. ziziæ*, and the third the most common form, I believe was the *P. modesta* of Say. Of the four or five other species of Prosopis occurring in this state there is little probability that any one of them can be Say's species, so that there would seem to be no objection to the acceptance of this identification of *P. modesta*.

Say's description of the female of *P. modesta* is as follows:—"♂. Black, opake; abdomen polished; hypostoma on each side with a triangular spot; collar with an abbreviated, transverse, yellowish line on each side; pleura with a yellowish spot under the humerus; wings hyaline, with blackish nervures; feet with whitish knees. Length over one fifth of an inch."

It will be noticed that there is no mention of a spot on the edge of the wing base, or on the tegulæ, so that the description cannot apply to *P. ziziæ*. To suppose that Say omitted to mention these marks would be a gratuitous assumption, the burden of proving which would rest upon the person suggesting it. I give below

the more important characters of the two sexes drawn from material collected at Elkhart, Indiana.

♀.—Length 6½ mm. Black, with lemon yellow marks on the face, collar, tubercles and legs. Head a little longer than broad, the clypeus minutely roughened with sparse very faint punctures; face above the insertion of the antennæ closely and finely punctured; the yellow mark on each side of the face triangular with a small notch opposite the socket of the antennæ, the upward extension pointed, but in a large Maine series variable in form. Two spots on the collar; mesothorax closely and strongly punctured; the tubercles yellow. Wings hyaline tinged with fuscous, nervures, stigma and tegulæ chestnut brown, or the tegulæ darker. Legs black, the anterior and intermediate tibiæ in front at base, and the entire basal half of posterior tibiæ yellow, tarsi chestnut brown. Enclosure on disc of metathorax distinct, the base coarsely ridged. Abdomen smooth and shining, the first segment very finely and sparsely punctured, the apical margins of the segments brownish.

♂.—Length 5½ to 6 mm. Clypeus, supra-clypeus, and sides of face lemon yellow, the upward lateral extensions obtusely pointed. Two spots on the collar, the tubercles, the anterior tibiæ in front, the intermediate and posterior tibiæ at base, and all the tarsi pale yellow. The antennæ black, the flagella light brown beneath. The face finely, the mesothorax strongly punctured; the enclosure of the metathorax coarsely and irregularly pitted. Wings nearly hyaline or tinged with fuscous, nervures, stigma and tegulæ chestnut brown, or the tegulæ piceous. First abdominal segment smooth and shining, finely and sparsely punctured.

The male described by Say does not belong to this species, and can not be determined with much certainty. *P. illinoiensis* Robt. is closely allied to *P. modesta*, but the male is described as having the first abdominal segment impunctate. *P. pennsylvanica* Ckll. has the marks chrome yellow. *P. modesta* is a very common species in the eastern states, and in a large series of specimens exhibits considerable variation. The interrupted yellow line on the collar is wanting in a few specimens, and rarely there is a yellow dot on the tegulæ. The males sometimes have a spot on the labrum and yellow lines on the mandibles; the punctation of the 1st abdominal segment also exhibits considerable variation. Specimens of the female have been taken on *Rubus strigosus*, June 16; *Aralia hispida*, July 16; Solidago, August 19; *Eupatorium perfoliatum*, August 25; of the male on *Rubus strigosus*, June 25; *Spiræa salicifolia*, July 16; *Aralia hispida*, July 28; and Solidago, August 19.

Prosopis variifrons Cr.

1869. *Prosopis variifrons* Cr. ♀, Pr. Bost. Soc. Nat. Hist. 12:270.
1869. *Prosopis antennata* Cr. ♂, Pr. Bost. Soc. Nat. Hist. 12:271.

It is probable that *P. antennata* is the male of *P. variifrons*. Both forms have been found in New Mexico and Colorado, but there is no record of the capture of the opposite sex of either species. The possibility that they represented the sexes of a singles species was pointed out by Professor Cockerell in the Entomologist, in 1898, and after examining specimens from both of the localities mentioned I am inclined to believe that this is the case. They agree in the following characters: deep black color with nearly white marks, immaculate color, tubercles and tegulæ spotted, longitudinal crenulate rugæ covering the entire enclosed area upon the metathorax, head and thorax opaque, finely and closely punctured, and color of the wings. The female often has a transverse trilobed mark upon the clypeus, but in some instances only the two lateral lobes are present and in others only the central lobe. At Waldoboro I have taken only one male on *Cratægus coccinea*, June 14, 1905.

Prosopis elliptica Kirby.

1837. *Prosopis elliptica* Kirby, ♀, Faun. Bor—Am. 4:266.

This species is very closely allied to *P. variifrons*. Through the kindness of Mr. H. L. Viereck I have three specimens, which I refer to *P. elliptica* ♀, collected by Morgan Hebard at Pequaming, Mich., July 1, 3, and 12, 1903. They differ from *P. variifrons* in having the marks lemon yellow instead of nearly white, while the tegulæ are unspotted. As in *P. variifrons* the collar is wholly dark, the tubercles spotted, the face-marks bow shaped, and there is a transverse mark on the clypeus sometimes reduced to a central spot. The differences are evidently varietal rather then specific and it is not improbable that *P. elliptica* replaces *P. variifrons* northward, as the type locality is British America. Until the male is definitely known its position can hardly be determined with certainty. I have taken one female at Waldoboro, July 2, which I refer doubtfully to this species.

Prosopis verticalis Cr.

1869. *Prosopis verticalis* Cr. ♂, Pr. Bost. Soc. Nat. Hist. 12:271.
1909. *Prosopis verticalis* Lov. ♀, Ent. News, 20:413.

I have taken one male at Waldoboro on an umbelliferous plant, July 14, which agrees with the description in all respects except that there is a small spot on each tegula. From Falls Church, Va., from Dr. Nathan Banks, I have one male and two females. In all three specimens the tegulæ are unspotted. The face-marks of the ♀ are bow-shaped and the collar is dark as in *P. variifrons*, but the mark on the clypeus is absent. The anterior and intermediate legs are wholly black, but the posterior tibiæ, are ringed with yellow. The rugæ of the enclosure upon the metathorax are longitudinal.

Prosopis basalis Sm.

1853. *Prosopis basalis* Sm. ♀ ♂, Cat. Hym. Brit. Mus. 1:23.
1869. *Prosopis basalis* Cr. ♀ ♂, Pr. Bost. Soc. Nat. Hist. 12:269.
1901. *Prosopis basalis* Lov. ♀, Ent. News, 12:4.

Female taken on the wild rose, July 10, 1905; and on *Aralia hispida*. The type locality is Hudson's Bay. A widely distributed species also reported from Colorado and New Mexico. I have a female from Point Abbaye, Mich., July 10, and a male from Pequaming, Mich., July 1, both collected by Morgan Hebard. The form of the dilated scape in the male is very remarkable, but no explanation of its ecological significance seems ever to have been suggested.

A GYNANDROMORPHOUS MUTILLID.[1]

By William Morton Wheeler.

On the first day of August, 1910, while I was collecting in a dry upland pasture near Colebrook, Litchfield County, Connecticut, my attention was attracted by a small Mutillid with wings only on one side. It was running over the ground very rapidly, and on being captured proved to be a very handsome lateral gynandromorph of *Pseudomethoca canadensis* Blake, the right half of the body, including the appendages, being purely male and black, whereas the left half was largely of a rich red color and, except in a few insignificant details, purely female. Although the legs on the left side are stouter than those on the right the insect did not move in a circular but in a rectilinear path and was therefore able to compensate the difference in the strength of the appendages on the two sides of the body. The specimen was not dissected, since, owing to the small size of the abdomen and the hardness of the integument, I was sure of injuring the specimen and by no means sure of gaining an adequate conception of the structure of the reproductive organs. There can be little doubt, however, that these organs consist of an ovary on the left and a testis on the right side. The accompanying camera drawing of the insect in dorsal view, and of the head as seen from the front, together with the following description, will give an idea of the external structure:

The specimen is a little over 5 mm. in length. The two halves of the body, owing to the pronounced sexual dimorphism, are asymmetrical. The head is much smaller on the right than on the left side. The eyes are of nearly equal size; two ocelli are present on the male side, namely the anterior, or median, and the right lateral ocellus. The right mandible is tridentate, the left simply falcate. The right antenna is 13-jointed and much longer than the left, which is 12-jointed. The sharp line which separates the black coloration of the right from the red of the left side of the head begins at the middle of the occipital border, runs forward just a little to the left of the median ocellus, and terminates a little to the right of the middle of the clypeus. The clypeus

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 27.

is black on both sides; the right mandible is black, the left red. The scape of the left antenna and the two basal joints of the funiculus are red. The tip of the second funicular joint, together with the third and fifth joints, are dark brown and the remainder of the funiculus is black. The palpi on the right side are black, on the left side red, with their terminal joints infuscated. The left side of the head bears on the lower side the peculiar tooth and carina so characteristic of the female, whereas these structures are lacking on the right side. The left half of the thorax is typi-

Fig. 1. *Pseudomethoca canadensis* Blake, lateral gynandromorph; *a*, dorsal aspect; *b*, head seen from the front.

cally female, without sutures and deep red; the right half is somewhat longer and of the male type and black, with the sharp line separating the two halves rather sinuous or indentated towards the right in two places which correspond with the transverse suture between the mesonotum and scutellum and with that between the scutellum and metanotum. The epinotum is dis-

tinctly more convex and rounded on the right than on the left side. The tegula is well developed and the wings are normal on the right but completely lacking on the opposite side. The right legs are entirely black, except the spurs, which are white, and lack the spines on the extensor surfaces of the tibiæ. On the left side the legs have distinctly incrassated femora and somewhat clavate tibiæ. They are red, except the distal halves of the femora and tibiæ and the tips of the tarsal joints, which are black. The middle and hind tibiæ have the prominent spines so characteristic of the female on their extensor surfaces. The abdomen has six complete segments and apparently a vestige of a seventh on the right. It is asymmetrical owing to the enlargement of the second segment on the left, or female side. It is black, except for a large red spot on the left side of the middle line on the first and another similar but larger spot on the second segment. The line separating the male from the female half of the abdomen on the dorsal side runs a little to the right of the middle line but on the ventral surface it is very nearly median. The appendages at the tip of the abdomen are represented by the left half of the sting sheath, the left stylet and the left half of the gorgeret which is very long and slender, fully exerted and curved over to the right. The hypopygial area of the female is also recognizable on the left side. The male appendages are much less distinct, but it seems to be possible to detect what corresponds to the right stipes. The sculpturing on the two sides of the body corresponds to that of the respective sexes, the punctation being nearly the same on both sides of the head but decidedly coarser on the pro- and mesonotum of the right than on the corresponding regions of the left side of the thorax. The left pleuræ are concave and glabrous, on the right side they are convex and coarsely punctuate. The reticulate rugosity of the right half of the epinotum is coarser than that on the left half. The hairs on the right half of the head and thorax are distinctly longer than on the left half of these regions. Those on the entire male half are glistening white. They are also glistening white on the female half except on the second abdominal segment where those at the base and apex are black and those in the middle are yellow. The hairs on the legs are not appreciably longer or more abundant on the right than on the left side.

This description shows that the only particulars in which the left or female side departs from that of the normal female is in the coloration of the clypeus and the base of the third abdominal segment. Both of these regions are red in the normal female. At any rate, I find them to be of this color in some thirty specimens which I have examined, in twenty-eight collected by Mr. C. T. Brues at Woods Hole, Mass., several years ago, and in two taken by myself at Forest Hills, Mass., and Colebrook, Conn., during the past summer. In the mounted gynandromorphous specimen the third abdominal segment may be red at the extreme base, but it is drawn into the second segment so far that I am unable to determine its complete coloration.

Reference to the work of Dalla Torre and Friese on gynandromorphous Hymenoptera[1] shows that up to 1898 only one gynandromorphous Mutillid had been seen, and I have been unable to find that any others have been described within more recent years. The specimen mentioned by these authors is a *Mutilla europæa* L. var. *obscura* Nyl. which was described and figured by Maeklin in 1856.[2] This specimen, which was taken at Helsingfors, Finland, was a very perfect lateral gynandromorph, in which, however, the sex of the two sides was the reverse of that in the above described specimen of *Pseudomethoca*, being female on the right and male on the left side. Owing to the fact that the female *Mutilla obscura* has a dark head and the male a very similar coloration of the abdomen to that of the female the contrast between the two sides in Maeklin's specimen is less striking than in the one described above, and, as shown in his colored plate, shows strongly only in the thoracic region. There is, however, a distinct asymmetry of the abdomen, owing to the more bulging outline of the second abdominal segment on the female side. The specimen also shows the wings beautifully developed on the male side, and the strong contrast between the two antennæ.

Pseudomethoca canadensis is apparently a parasite on certain

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[1] Die hermaphroditen und gynandromorphen Hymenopteren. Ber. naturwiss. med. Ver. Innsbruck, XXIV, 1898 (1899), pp. 1–96, 1 pl.

[2] Om hermafroditism bland insekterna, samt beskrifning öfver en i Helsingfors funnen hermafrodit af Mutilla obscura Nyl. Öfvers. af Finska Vetensk. Soc. Forhandl. III 1856, pp. 106–112, 1 pl.

of our burrowing bees of the genus *Halictus*. Some years ago Melander and Brues published an interesting account of *H. pruinosus* Robertson.[1] In this they showed that the most formidable enemy of the bee is the *Pseudomethoca*. They found that the female *Pseudomethoca* hangs about the burrows and attacks the female bee, and they have given a very entertaining figure and description of a battle between the bee and the Mutillid. Fully fifty specimens of the latter insect were taken from one square meter of *Halictus* colony during a single summer. In the dry pasture in which I found the gynandromorph there were many *Halictus* colonies, so that, in all probability, the specimen had passed through its larval and pupal development in one of the nests.

LIST OF SPHINGIDÆ OF AMERICA NORTH OF MEXICO.

By William Barnes, M. D., and J. McDunnough, Ph. D.

Decatur, Illinois.

Since Rothschild & Jordan issued their Revision of the Lepidopterous Family Sphingidæ in 1903, no attempt has been made to give a complete list of our North American species based upon this monograph. Holland in his Moth Book follows their work but his list does not pretend to be complete; as several new additions to our fauna have lately come under our notice, and as we have been made aware of several slight errors in the revision relating to North American species, it has occurred to us that an annotated list would perhaps be of service to collectors and future catalog makers. We have followed the revision as regards nomenclature in nearly every case, basing our remarks upon material in Coll. Barnes, which is practically complete in North American Sphingidæ. The list of localities is not intended to be exhaustive, but in most instances merely mentions localities from which we actually possess specimens.

For the benefit of those unfamiliar with Rothschild & Jordan's

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[1] Guests and Parasites of the Burrowing Bee Halictus. Biol. Bull. V, No. 1, June 1903, pp. 1–27, 6 figs.

monumental work, we might state that the trinomial system of nomenclature here adopted is based on the fact that all species are more or less liable to geographical variation; taking the first geographical race described as the name for the whole species, the names of the different racial forms are merely added to this name without intervention of the term *var.* Thus *chersis oreodaphne* would be equivalent to *chersis var. oreodaphne*, and, since the first described race is as much a geographical variety as all others, the name *chersis chersis* must be used to indicate the typical race. Variations within the limits of a single race are termed forms; thus we have *P. modesta imperator f. t. kunzei* which indicates the summer form (kunzei) of the *imperator* race (Ariz.) of *P. modesta Harris.*

In conclusion we might state that we are thoroughly in sympathy with the system of nomenclature advocated so ably by Rothschild & Jordan. The making the first species mentioned under a given generic name the type of that genus may seem at first sight rather radical, but it at least possesses the advantage of being absolutely infallible, besides saving an enormous amount of misspent labor in searching through ancient and musty volumes, as is involved under the "restriction" principle, a principle only capable of being carried out with any fairly assured certainty of success when one has the entomological literature of the world at one's command. Surely a system which will assure a lasting stability and uniformity in our only too involved entomological nomenclature should be hailed with acclamation by all those who have the true welfare of entomology at heart; like a dose of purging medicine it may cause considerable discomfort for a time, but if the result will be to free our successors from all the difficulties we are at present contending with, then let us submit with cheerful spirits to any such slight personal inconvenience as it may entail.

List of Sphingidae north of Mexico.

Subfamily ACHERONTIINÆ.

Tribe ACHERONTIICÆ.

Genus **Herse** Oken.

(1) **H. cingulata** Fabr. N. Y. to Tex.
ab. decolorata Hy. Edw.

Tribe Sphingicæ.

Genus **Cocytius** Hbn.

(2) **C. antaeus** Drury.
(a) **antaeus medor** Stoll. Fla.

Typical *antœus* is taken in the Antilles, not in N. America.

Genus **Protoparce.** Burm.
(3) **P. sexta** Johanns. U. S.
syn. *carolina.*

Holland mentions *P. occulta R. & J.* from Texas. We do not, however, know of any authentic specimens from this locality. It occurs in Mexico.

(4) **P. quinquemaculatus** Haw. Nearctic Region.
syn. *celeus.*
(5) **P. rustica** Fabr. N. Y. southward.
(6) **P. brontes** Dru.
(a) **brontes cubensis** G. & R. Southern Florida.

The typical *brontes* is confined to Jamaica, and Drury's citation of New York as habitat was doubtless due to an error. The form found in South Florida, of which Dr. Barnes has 4♂'s, is *cubensis* G. & R. and differs from *brontes* only in its clearer markings and slightly more variegated appearance.

(6a) **P. muscosa** R. & J. Tex., Ariz.

Recorded by Doll from Texas; 1♂ in Coll. Barnes from Prescott, Ariz. ex.—larva.

(7) **P. brevimargo.** Butl. Ariz.

This species has been placed by Rothschild & Jordan in the synonomy of *P. florestan*, which species is characterized by the possession of a pulvillus on the claw segment. Dr. Barnes has, however, recently received a single ♂ specimen from Huachuca Mountains, Ariz., in which the pulvillus is *not* present on any of the claws. According to Rothschild & Jordan this would place it under *P. corallina* Druce. Druce in his Biol. Cent. Amer. figures both species, and the specimen in question agrees so exactly in all particulars with his figure of *brevimargo* that we have had no hesitation in identifying it as this species. Until further material is forthcoming we consider it advisable to treat *brevimargo* as a

separate species. There is no doubt about the authenticity of the locality, and we are in hopes of receiving further specimens another year, which may throw some light on the synonomy of this difficult group.

Genus **Chlaenogramma** Sm.
(8) **C. jasminearum.** Guer. — Ohio, N. J., D. C.
Genus **Dolba** Walk.
(9) **Dolba hylaeus.** Drury. — N. Y., Md., Ill., Tex.
Genus **Dolbogene** R. & J.
(10) **D. hartwegi** Butl. — Ariz.

1♂ in Dr. Barnes' collection taken by O. Poling in Southern Arizona.

Genus **Isogramma** R. & J.
(11) **I. hageni** Grt. — Tex.
Genus **Ceratomia** Harris.
(12) **C. amyntor** Hub. — N. Y., Penn., S. Dak.
(13) **C. undulosa** Walk. — S. Dak., Ill., Penn.
(14) **C. catalpae** Bdv. — N. Y., Ky.
Genus **Isoparce** R. & J.
(15) **I. cupressi** Bdv. — Geo., Fla.
Not in Dr. Barnes' Coll.
Genus **Dictyosoma** R. & J.
(16) **D. elsa** Stkr. — Arizona.
Genus **Atreus** Grt.
(17) **A. plebeja** Fabr. — N. Y., N. J., Ala., Tex.
Genus **Hyloicus** Hbnr.
(18) **H. lugens** Wlk. — S. Western States?
syn. *andromedæ*. Bdv.

We do not know of any authentic record of this species having been taken in the United States, but Neumœgen mentions that a few specimens have been captured in the southwestern states. Possibly he was in error regarding the species.

(19) **H. geminus** R. & J. — Tex.

Two Specimens in Coll. Barnes labelled Galveston, Texas, received as *lugens*, correspond with this new species. It may be separated from the foregoing by the large black markings on underside of abdomen.

(20) **H. eremitus** Hub. — N. J., N. Y., Md., Ill.
(21) **H. eremitoides** Streck. — Tex.

This species, so frequently confused with *lugens* and *separatus*, may at once be separated from the former by its much smaller size and gray color, and from *separatus* by the fact that "the prothoracic tegulæ have no obviously yellow marginal spots." In Coll. Barnes are 4 ♂ and 4 ♀ from Kerrville, Texas.

(22) **H. separatus** Neum. New Mexico.

This species was long regarded as equivalent to *andromedæ* Bdv.=*lugens* Walk. It is however smaller and lighter in color than this form, and is most readily distinguished by the presence of a distinct yellow marginal spot on each side of the collar; these spots are always vestigial in the nearly allied species. Dr. Barnes possesses 2 ♂ and 3 ♀ from New Mexico.

(23) **H. istar** R. & J. Tex.

This is the largest species of the group and is represented in Coll. Barnes by 2 ♂ and 2 ♀, from Kerrville, Texas. Apart from difference in the genitalia it is separated from its near allies by the fact that the interspace between the black middle stripe of the prothoracic tegulæ and the black upper edge is dark brown, much deeper in color than the thorax and adjacent parts. It also lacks the black longitudinal line in the upper portion of cell on primaries.

(24) **H. chersis** Hbn.
(a) **chersis pallescens** R. & J. N. Mex., Ariz
(b) **chersis oreodaphae** Hy. Edw. Cal.
(c) **chersis chersis** Hbn. Eastern States.

A careful examination of the specimens in Coll. Barnes named *oreodaphæ* revealed the fact that with the exception of 2 ♀ they were all referable to the form *asellus* of *perelegans*. These 2 ♀'s belong to the new form, *pallescens*. Apart from their larger size and the marked difference in genitalia they may be most easily distinguished from *asellus*, to which they bear a strong superficial resemblance, by the fact that the gray color of primaries is much less even than in *asellus* and always shows whitish markings below the black dashes, exactly as in typical *chersis*. The broader white band distal to the black marginal line on primaries, as well as the faint black middle line on patagia by which Rothschild & Jordan differentiate *asellus*, are not always very

prominent in this species, but may, however, often be used as a means of separation.

(25) **H. vancouverensis** Hy. Edw.
(a) form **albescens** Tepp. Utah, Colo., Wash., B. C., Man.

The specimens in Dr. Barnes' Coll. do not seem to verify Bruce's statement that *vancouverensis* and *albescens* are two seasonal forms. We have specimens of *vancouverensis* dated May 8 (Colo.), May 10 (Wash.), June 16 (Colo.), June 9 (Manitoba), July 8, 24, (Colo.), and *albescens* dated May 1 and 5 (Colo., B. C.), June 24 (Colo.), and July 26 (Colo.).

(26) **H. libocedrus** Hy. Edw.
(a) **libocedrus libocedrus** Hy. Edw. Ariz.
(b) **libocedrus insolita** Lint. Tex.

Rothschild & Jordan separate these two geographical races by the color of the abdominal side spots, in *libocedrus* they are white, whilst in *insolita* they have a yellowish tinge. Lintner in his original description of *insolita* states, however, that "elongated patches (bands) of *clear white scales* extend over nearly half of each of the segments on its anterior half." Of the two specimens we have seen from Texas, both ♀'s, one has the spots of a distinct yellowish tinge, in the other they are almost pure white, so we are inclined to think that Rothschild & Jordan's diagnosis will hardly hold. The material of *libocedrus*, however, at our disposal is too much worn on the abdomen to allow of our forming a definite opinion in this respect.

(27) **H. perelegans** Hy. Edw.
(a) form **asellus** R. & J. Colo., Ariz.
(b) " **perelegans** Edw. Cal., B. C.

Apart from the difference in genitalia it is almost impossible to separate *asellus* from a small gray form of *chersis*. The form of the harpe is, however, so markedly different in both species that even a superficial examination of the genitalia serves to separate them. Whether *asellus* is a form of *perelegans* or may prove to be a good species we do not feel competent to decide. As far as our own experience goes, the two forms occur in different territory, which would at least point to a geographical sub-

species. *Asellus* seems fairly common in Colorado and Arizona, much more so than the form *pallescens* of *chersis*.

(28) **H. canadensis** Bdv. N. Hamp.
(29) **H. francki** Neum. Baltimore, Md.
Two specimens in Coll. Barnes.
(30) **H. kalmiae** Ab. & Sm. N. Y., Penn., Va.
(31) **H. gordius** Cram.
(a) **gordius oslari** R. & J. Colo.
(b) **gordius gordius** Cram. N. H., N. J., Va., Minn., Ill.

The Colorado race is easily distinguishable from the eastern specimens by its much greater size and the paler color of primaries.

(32) **H. luscitiosa** Clem. N. Y., N. J.
(33) **H. drupiferarum** A. & S.
(a) **drupiferarum drupiferarum** A. & S. Atlantic Subregion.
(b) **drupiferarum utahensis** Hy. Ed. Pacific States.

The western form *utahensis* is said to be whiter than the eastern form. Dr. Barnes has however a long series from Colorado, Oregon and British Columbia which it is impossible to separate from the ordinary *drupiferarum* of the east. In fact New York specimens in the same collection are considerably whiter than some of the western species. One ♀, however, from British Columbia corresponds exactly with Hy. Edwards' original description, having the primaries much more suffused with whitish gray, and the median band of the secondaries much broader, both of which points of difference do not hold for the remaining western specimens. We would be inclined to consider *utahensis* as merely an aberrant form of *drupiferarum* and not a geographical subspecies as treated by Rothschild & Jordan.

(34) **H. dolli** Neum.
(a) **dolli coloradus** Sm. Colo., Utah.
(b) **dolli dolli** Neum. Ariz.

We consider Rothschild & Jordan correct in treating these as merely geographical varieties of the same species. *Dolli* lacks the black submarginal line and the dashes of the posterior portion of the disk, corresponds, however, in all other respects with *coloradus*.

(35) **H. sequoiae** Bdv. Cal.
(36) **H. pinastri** Linn.

Dr. Barnes has two specimens of this species, one labelled California, the other Waghorn, Alberta. The Californian specimen lacks the black dashes usually found in *pinastri* and has further the brown crossbands of primaries more strongly developed than in the Alberta specimen.

Genus **Lapara** Walk.
(37) **L. coniferarum** A. & S. N. Y., R. I.
(38) **L. bombycoides** Wlk.
syn. *harrisii* Clem. Me., N. Y., Minn.
(39) **L. pineum** Lint.

Rothschild & Jordan regard this as an extreme aberrant form of *coniferarum*. We do not know the species, and believe that only two specimens have ever been taken.

Genus **Exedrium** Grt.
(40) **E. halicarniae** Stkr. Fla.

Subfamily AMBULICINÆ.

Genus **Protambulyx** R. & J.
(41) **P. strigilis** L.
ab. **rufipennis** Btlr. Fla.?

In Dr. Barnes' collection is a specimen labelled Palm Beach, Fla., received as *P. carteri R. & J.* This on a careful examination proved to be *P. strigilis, ab. rufipennis.* We cannot however vouch for the correctness of the locality label.

(42) **P. carteri** R. & J. Fla.

Rothschild & Jordan give Florida as a locality for this new species on the strength of a single ♂, received from the Kny Scheerer Co.

Genus **Sphinx** L.
(43) **S. cerisyi** Kirby.
(a) **cerisyi cerisyi** Kirby. Man., Ont., Me., N. Y.
(b) **cerisyi astarte** Stkr. Colo., Utah
(c) **cerisyi ophthalmica** Bdv. Cal., Wash., Nev., B. C.
(a) form **pallidulus** Edw.
(d) **cerisyi saliceti** Bdv. Ariz.

Two ♂'s in Dr. Barnes' collection labelled Catskill Mountains differ so decidedly from typical *cerisyi* in shape of wing and post-discal lunules, approaching in this respect, as well as in the browner ground color, the form *ophthalmica*, that one wonders if an error in labelling has not occurred somewhere. Both these ♂'s are further remarkable for the entire lack of the white dash at end of cell.

Saliceti Bdv. is a brown form from Arizona in which the second blue spot of the eye mark on secondaries is straight and not curved towards the third spot. All three blue spots are present and distinct from each other.

(44) **S. jamaicensis** Drury.
(a) form norm. **geminatus** Say. — N. J., Ill.
(b) f. ab. **jamaicensis** Dru.
(c) f. ab. **tripartitus** Grt.

In Dr. Barnes' collection is a remarkable aberration lacking all markings on both primaries and secondaries with the exception of the apical lunules.

Genus **Calasymbolus** Grt.
(45) **C. excaecatus** A. & S. — Ill., Colo., B. C.
(46) **C. myops** A. & S. — Mass., Pa., Ohio, Colo.
(47) **C. astylus** Dru. — N. Y., N. J.
Genus **Pachysphinx** R. & J.
(48) **P. modesta** Harris.
(a) **modesta modesta** Harris. — Ill., B. C.
syn. *occidentalis* Edw.
(b) **modesta imperator** Stkr. — Colo., Ariz.
(a′) f. t. **kunzei** R. & J.

The form *kunzei* is the extremely pale summer brood of *imperator* Stkr.

Genus **Cressonia** G. & R.
(49) **C. juglandis** A. & S. — N. Y., Mass., Ohio, Ark., Tex.

Subfamily SESIINÆ.

Tribe DILOPHONOTICÆ.

Genus **Pseudosphinx** Burm.
(50) **P. tetrio** L. — Fla., Tex.
Genus **Erinnyis** Hbn.
(51) **E. alope** Dru. — Fla.
syn. **edwardsii** Butl.

(52) **E. lassauxi** Bdv.
f. **merianae.** Fla.

The typical *lassauxi* Bdv. occurs only in South America. The Florida form with the red area of hind wings prominent is f. *merianæ*.

(53) **E. oenotrus** Stoll. Fla.
(54) **E. crameri** Schaus. Fla.
(55) **E. ello** L. Fla., N. Mex.
(56) **E. obscura** Fabr. Fla., Tex., Ariz.
(57) **E. domingonis** Butl. Tex.
syn. *festa* Hy. Edw.

Rothschild & Jordan treat this as a good species.

Genus **Grammodia** R. & J.
(58) **G. caicus** Cram. Fla.

Tribe Sesiicæ.

Genus **Pachylia** Walk.
(59) **P. ficus** L. Fla.

In Coll. Barnes is also a specimen of *P. resumens* Wlk. labelled Florida. We fear however to add this species to the list as we cannot vouch for the authenticity of the label. Rothschild & Jordan, however, give Florida as a locality.

Genus **Madoryx** Bdv.
(60) **M. pseudothyreus** Grt. Fla.

In Coll. Barnes two specimens from Chocoloskee, Fla. Also reported by Laurent from Miami, Fla. (Ent. News, XIV, 59 & 305.)

Genus **Hemeroplanes** Hbn.
(61) **H. parce** Fabr. Fla., Tex.

Rothschild & Jordan give Florida as a locality for this species. In Coll. Barnes are three specimens labelled Texas. It probably occurs in all the southwestern states.

Genus **Epistor** Bdv.
(62) **E. lugubris** L. Ga., Fla.

Among a long series of this species in Coll. Barnes we also discovered a pair of *E. ocypete* L. the ♀ of which was labelled Florida. We refrain however from adding this species to the list until more authentic data can be secured.

Genus **Cautethia** G. & R.
(63) **C. grotei** Edw. — Fla.
Genus **Sesia** Fabr.
(64) **S. tantalus** L.
syn. *ixion* L.
(a) **tantalus zonata** Dru. — Fla.

The typical *tantalus* is the South American form. The form *clavipes* with protarsal segments 3–5 club shaped is the Mexican form and may possibly occur as a wanderer farther north. The form *zonata* with normal tarsi and reduced white spots on primaries occurs in Florida and the West Indies.

(65) **S. titan** Cram. — Tex.

This species which has been so frequently confounded with *tantalus* is characterized by Rothschild & Jordan as follows: "Discal spots of forewing always simple, never divided, white scaling at anal angle of hind-wing more extended and denser, fore leg of ♂ with two conspicuous black tufts, one at end of femur, the other near the apex of the tibia." In Coll. Barnes two specimens from Shovel Mountain, Texas.

(66) **S. fadus** Cram. — Fla.

Occurs as a wanderer in the southern states. The white discal spots of primaries are always partly double in this species.

Genus **Haemorrhagia** G. & R.
(67) **H. thysbe** Fabr.
(a) form **fuscicaudis** Walk. — Southern States.
(b) form **thysbe** Fabr. — Tex., Ill., Ark.
syn. *ruficaudis* Kirby.
(c) form **cimbiciformis** Steph.
syn. *uniformis* G. & R. = *ruficaudis* Walk.
buffalœnsis G. *floridensis* G.

We have adopted the synonomy of Rothschild & Jordan in dealing with this species; *fuscicaudis* is the southern form with dentate margins of wings and the abdomen from fourth segment on of a chestnut-red color. *Thysbe* is the well-known form with olive markings on last abdominal segments and dentate margins of primaries, whilst *cimbiciformis* has the margins of wings not dentate.

(68) **H. gracilis** G. & R.	N. Y.
(69) **H. diffinis** Bdv.	
(a) **diffinis diffinis** Bdv.	Atlantic States.
(a′) f. vern. **tenuis** Grt.	
(b′) f. æst. **diffinis** Bdv.	
(c′) f. æst. **axillaris** G. & R.	
(b) **diffinis aethra** Stkr.	Me., Montreal, Que., Nipigon, Ont.
(c) **diffinis ariadne** n. nov.	Colo., Man.
syn. *senta* R. & J. (non Strecker).	
(d) **diffinis thetis** Bdv.	Pacific Subregion.
(d′) f. **thetis** Bdv.	Cal.
syn. *palpalis* Grt.	
(e′) f. **cynoglossum** Edw.	Cal.
(f′) f. **rubens** Hy. Edw.	Ore., B. C., Ariz., Utah.

We have been obliged to differ from Rothschild & Jordan in the above arrangement as an examination of Strecker's types has convinced us that his two species *æthra* and *senta* have never been properly recognized. In Group A., *diffinis diffinis*, we have followed the revision; the various seasonal forms of this eastern race are well known; *tenuis*, with non-dentate border of fore wing, represents the spring brood, whilst *diffinis* and *axillaris*, which only differ from each other in the more or less prominent dentation of the border on primaries, constitute two summer forms.

Æthra Stkr. has been placed by Rothschild & Jordan as a synonym of *axillaris G. & R.*, due probably to a statement of Smyth's (Ent. News, 1900, p. 585) that he has bred the form *æthra* from *tenuis* ova. While we recognize the fact that some specimens of *tenuis* tend to lose the dark abdominal band and develop a red apical spot, we consider the true *æthra* well distinct from such specimens. The type specimen, which we have examined, is from Montreal, Que.; besides this there are in the Strecker Coll. several very perfect specimens from Bangor, Me., and in Coll. Barnes 5 ♂♂, 1 ♀ from Nepigon, Ont. These all agree exactly with one another and differ from other eastern forms of *diffinis* in the roughness of the body squamation. The yellow of thorax and abdomen is not the pale yellow of *diffinis* or *tenuis* but rather an orange-brown, bordered narrowly with a pale yellow extending along patagia and sides of abdomen; the red apical patch is sharply defined and not continued along outer margin; the red of anal angle on secondaries is bright and the base of primaries

is also largely suffused with same color; the type specimen has a slightly dentate margin on primaries, not nearly so marked as in *axillaris;* the remaining specimens are almost smooth. The localities would point to the fact that this is a well-marked northern race, probably occuring in only one generation, our Nepigon specimens being taken July 8–15. The race has not the slightest resemblance with *axillaris.*

An examination of Strecker's type of *senta* has shown us that it is identical with the species hitherto known as *brucei French.* Rothschild & Jordan are in error in giving this name to the form with yellow centre to anal tuft dorsally. Strecker in his description distinctly states "anal tuft black," and the type agrees with the statement. In the Streck. collection this form with yellow centre is placed under *brucei Fr.* but this is evidently wrong, for the original description of this latter species states "terminal joint with its tufts, *both lateral and central,* jet black." As the type of *brucei* has been destroyed by Dermestes, the description is all that remains to us for purposes of identification; in Coll. Barnes, however, are several specimens labelled *brucei* and taken by Bruce himself in the same locality as the type specimen; these agree with *senta,* so we consider our reference fairly certain. As *senta Stkr.,* having priority, must be retained in place of *brucei Fr.,* we propose the name *ariadne* for the above form and append following description.

H. diffinis ariadne n. nov.

Palpi black above, pale yellow beneath; front, sides of thorax and patagia lemon yellow; centre of thorax darker, shaded with olive brown, which color extends over dorsal portion of abdomen to anal tuft; the black banding of 4th and 5th abdominal segments, characteristic of *tenuis,* not present; only in worn specimens does it seem to occur. Abdominal segments 1–5 broadly bordered laterally with black with traces of a few white scales intermixed; segments 6 and 7 somewhat lighter dorsally than preceding with pale yellow lateral tufts, extending sometimes to 5; anal tuft centrally orange yellow, laterally black; beneath black. Pectus yellow, legs black, with yellow tufts on tibiæ; abdomen beneath black with very slight sprinkling of yellow hairs on posterior segments, differing markedly in this respect from *senta,* in which the abdomen is grayish yellow beneath. Primaries hyaline with narrow brown-black terminal border, broadest at apex; the border is more or less suffused with rusty-red and contains a distinct apical spot of same color; base of wings deep red-brown with scattered yellow hairs; costal border slightly reddish with a few yellow scales. Secondaries, with very narrow border, distinctly reddish; anal patch reddish, intermixed with

yellow along inner margin. Beneath as above, slightly paler, base and costa of fore wing and costa of hind wing largely pale yellow; anal patch of secondaries broadly black along inner margin. Expanse 1½ in. = 38 mm.

Habitat: Denver, Colo., described from 14 specimens. Types, Coll. Barnes.

All the forms of *thetis* differ from the eastern races in having the anal tuft entirely black.

Diffinis thetis Bdv. is found typical in certain regions of California along the coast. It lacks all trace of red on wings, having the margins and patches deep chocolate brown. The form *cynoglossum* Edw. is similar to *thetis* but can at once be separated by the entirely black hind tibiæ, lacking the yellow hair of *thetis*. Holland's description of *thetis* (Moth Book, p. 64) is obviously incorrect; he seems to have confused this form with our *ariadne*. We consider *rubens* Hy. Edw. perfectly worthy of being retained as a form name; in fact it seems the most widely spread of the western forms, judging by the material at our disposal. It is readily separated from the two preceding by the red apical spot and more or less pronounced red shading at base of primaries and on anal patch of secondaries. The typical locality is Oregon and we have specimens from Victoria, B. C., which agree exactly with the type specimen. A long series from Utah differ from our British Columbia specimens in larger size, smoother squamation, and brighter red, while other specimens from Arizona are still larger, attaining a size of 50 mm. wing expanse. We hardly consider these forms, however, worthy of a separate name.

(70) **H. senta** Stkr. Colo., Utah.
syn. *brucei* Frch.

This species is most easily recognized by the entirely yellow abdomen on underside and black anal tuft. For the synonomy we would refer to our remarks under the preceding species.

Subfamily PHILAMPELINÆ.

Tribe PHILAMPELICÆ.

Genus **Pholus** Hbn.

(71) **P. anchemolus** Cram. Tex.

Dr. Barnes has received one specimen from Kerrville, Texas.

(72) **P. satellitia** L.
(a) **satellitia pandorus** Hbn. Ill., Tex.
(73) **P. achemon** Dru. N. Y., Ill., Tex., Ariz.
(74) **P. typhon** Klug. Ariz.

Dr. Barnes has several bred specimens received from his collector in Palmerlee, Ariz.

(75) **P. vitis** L.
(a) **vitis vitis.** Tex.
syn. *linnei* G. & R.

This species, known since Grote & Robinson's revision as *linnei* is placed once more under *vitis* L. by Rothschild & Jordan. Any one interested in the elaborate proof as to the correct identification of Linné's species is referred to their work.

(76) **P. fasciatus** Sulzer.
syn. *vitis* Dru. (non Linn.) Tex.
(77) **P. labruscae** L. Tex.
Genus **Ampeloeca** R. & J.
(78) **A. versicolor** Harr. N. Y.
(79) **A. myron** Cram. Ill., Tex.
(a) f. **cnotus.** Fla.
Genus **Darapsa** Walk.
(80) **D. pholus** Cram.
syn. *cherilus* Cram. N. Y., N. J., Ill.
Genus **Sphecodina** Blanch.
(81) **S. abbotti** Swainson. N. J., N. Y.
Genus **Deidamia** Clemens.
(82) **D. inscriptum** Harr. N. Y.
Genus **Arctonotus** Bdv.
(83) **A. lucidus** Bdv. Wash., Cal.
Genus **Amphion** Hbn.
(84) **A. nessus** Cram. N. Y., Tex.
Genus **Proserpinus** Hbn.
(85) **P. gaurae** A. & S.
(a) form **gaurae** A. & S. Tex.
(b) form **circae** Edw. Ala.

We consider Rothschild & Jordan in error in placing *circæ* Edw. as a synonym of *gaurœ* A. &. S. and their remark that "Edwards, considering the following species (*juanita*) to be the true *gaurœ*, described a specimen of the present species as *circæ*"

shows a rather careless reading of the original description. Edwards knew both *gauræ* and *juanita* and distinguished *circæ* from both these species by the fact that the secondaries were dull chestnut red with no traces of a darker marginal band. In Coll. Barnes are two specimens from Alabama corresponding with Edwards' description, and agreeing with the type specimen in Coll. Neumœgen; these we place for the present as *form. circæ* of *P. gauræ*.

(86) **P. juanita** Stkr.
(a) **juanita juanita** Stkr. Tex.
(b) **juanita oslari** R. & J. Ariz.

We do not know the form *oslari* which differs from *juanita* in the paler color of wings and the vestigial character of the stigma of primaries.

(87) **P. clarkiae** Bdv. Colo., Ore., Cal.
(88) **P. flavofasciata** Walk.
(a) **flavofasciata flavofasciata** Walk. New England.
(b) **flavofasciata ulalume** Stkr. B. C.
(c) **flavofasciata rachel** Bruce. Colo.

A long series of *ulalume* from British Columbia in Coll. Barnes shows a considerable amount of variation; some specimens (especially ♀'s) show very little trace of the yellow band of secondaries, although none are so black as depicted in Strecker's original figure; others (mostly ♂'s) possess a clear orange yellow band on secondaries and are scarcely to be distinguished from *flavofasciata* from the east. We do not know the Colorado form *rachel* Bruce.

Genus **Euproserpinus** G. & R.
(89) **E. phaeton** G. & R. Cal.
(90) **E. euterpe** Hy. Edw. Cal.

Subfamily CHŒROCAMPINÆ.

Genus **Xylophanes** Hbn.
(91) **X. pluto** Fabr. Fla.
syn. *thorates* Hbn.

This is presumably the same species as that referred to by Laurent (Ent. News XIV, 305) under the name of *Thorates pergesa* (!). In Coll. Barnes is a long series from Florida.

(92) **X. porcus** Hbn.
(a) **porcus continentalis** R. & J. Fla.

Typical *porcus* is restricted by Rothschild & Jordan to Cuba. The form *continentalis* differs, apart from variation in the genitalia, in the less prominent stigma of primaries, as well as the more pronounced discal dots; the olive green shading outside the cell is also reduced. Dr. Barnes has one specimen *ex larv.* from Florida.

(93) **X. falco** Walk. Ariz.

Dr. Barnes has received three specimens of this species, bred by his collector in Arizona.

(94) **X. tersa** Linn. Fla., Tex.

Genus **Celerio** Oken.

(95) **C. gallii** Rott.

(a) **gallii intermedia** Kirby. Me., Colo., Wyo., B. C., Alta.
syn. *chamænerii* Harr.

(96) **C. lineata** Fabr.

(a) **lineata lineata.** N. Y., Ill., Colo., Ariz., Fla.

NOTES ON THE SPECIES OF ANYTUS GRT.

By John B. Smith, Sc. D.

Rutgers College, New Brunswick, N. J.

A recent re-arrangement of the genus made necessary by the accumulation of material has led to a somewhat closer study of the species, particularly with the view of fixing more accurately the standing of certain species. In Hampson's monograph *Hadena evelina* French, is included under the generic term, in my opinion erroneously; altho I am probably no nearer right in placing it with *Fishia*. The other species recognized in the monograph are *atristrigata* Smith, *privata* Wlk., with *monstrata* Wlk., *sculpta* Grt., and *plana* Grt., as synonyms, *profunda* Sm., and *obscura* Sm. More recently I have described *A. tenuilinea* from a single example received from Stockton, Utah.

Anytus atristrigatus Smith, is from Texas and differs from all the other species by having a conspicuous and continuous black streak through the submedian interspace from base to the outer

margin above the anal angle. The type of maculation is like that of *privatus*, but heavier, and the median lines are distinctly geminate. The types are both males.

Anytus privatus Wlk., better known as *sculptus* Grt., is of wide distribution throughout the eastern United States. While not one of the common species in most localities, it is by no means rare and flies in August and September. The squared, somewhat flattened thorax with its low divided creast recalls the Xyliniod genera and the type of maculation adds to this resemblance. But the wings are shorter and broader and the abdomen is not flattened. The colors are very light gray, resembling *Acronycta* so much that Walker described it once under the specific term *monstrata*, and the characteristic feature of the maculation is the indentation of the median lines in the sub-median interspace, supplemented by their connection through the black-edged and shaded claviform. The amount of black varies, so that there may be a very complete heavy bar dividing the median space, or there may be only a narrow line: the latter a somewhat rare form. There is little variation in other respects and the species once known is recognized with ease. The secondaries in the male are soiled white, outwardly powdery, with a blackish terminal line and some powdering on the veins. In the female the entire wing is a little smoky, an extra-median line is visible and usually also a discal spot.

The variety *planus* I have never seen. Mr. Grote describes it as having the median lines lost and the wing longitudinally shaded with whitish on median space, along internal margin, and diffusely beyond the reniform. None of the examples that I have seen even remotely approach this.

I have had under examination a series of 22 males and 25 females, most of them taken near Elizabeth, N. J., by Mr. Otto Buchholz, and they bring out nicely all variations that I have ever seen in the species.

Among my material, however, I picked out a series of five males and six females, that seemed different, and these I have named.

Anytus teltowa sp. nov.

Size and habitus of *privatus*, but darker throughout, the ground color of primaries being dark blue-gray instead of light ash-gray. In the male the secondaries

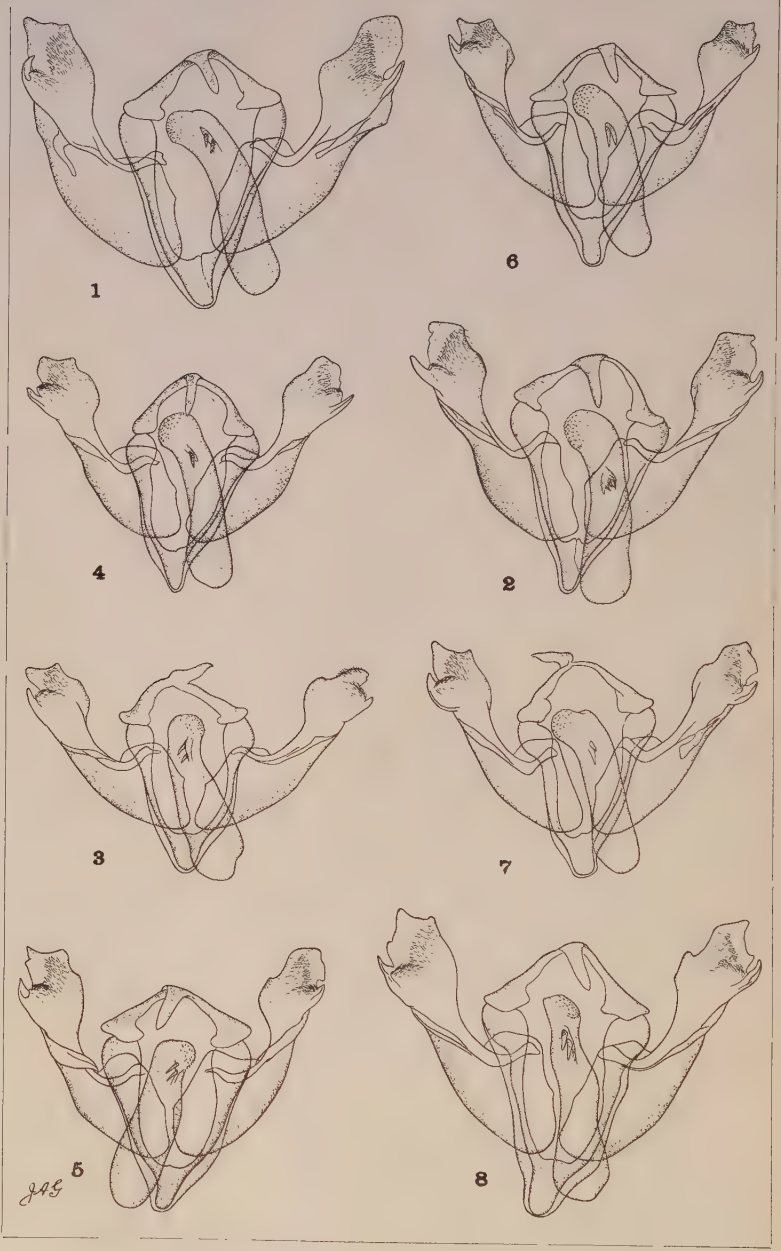
are like those of female *privatus*, while in the female they are smoky throughout, darker outwardly, with the exterior line and discal spot obscured. The black markings of primaries are heavier and more diffuse throughout, and the s. t. line is practically eliminated, the black shade which precedes the line in *privatus* continuing into and sometimes filling the terminal space.

Habitat: Hampton, N. H., IX, 20; Cohasset, Mass., IX, 3; Elizabeth, N. J., IX, 2-20; Lakehurst, N. J., IX, 27; Vineland, N. J., VIII, 29.

The structure of the genitalia in this genus so far as I have studied them, gives little help in the separation of the species. The harpes are very strong, highly chitinized, somewhat twisted and asymmetrical. As a result no two mounts lie in exactly the same plane and no two figures are entirely alike. There is, however, a somewhat marked difference in the width of the harpes as between *teltowa* and *privatus*, and a difference in outline which is especially marked in the right harpe as seen in the picture. Several specimens of *privatus* were studied, but only one of *teltowa*, and the figure given of *privatus* is like all the specimens of that form examined. *Atristrigatus* was not studied for lack of sufficient material.

Anytus tenuilinea Smith, was described from a single female sent in by Mr. Spalding of Stockton, Utah, and derives its name from the slender transverse lines and other markings. Other differences exist and are pointed out in the original description; but the creamy gray base and very narrow maculation are sufficient for its ready recognition. The interesting point is that I find in the material received from Cohasset, Mass., through Mr. Bryant, an almost exact duplicate of the type, also a female, under date of September 6. There were a dozen examples, representing both *teltowa* and *privatus*, but only this one female stood out from all the rest as *tenuilinea*.

In 1900 I described, in the Canadian Entomologist XXXII, p. 218, *Anytus obscurus* from a single Calgary male sent in by Mr. Dod, and *Anytus profundus*, from two Brandon, Man., males, sent in by Mr. Hanham. These species seemed to me distinct from the eastern *privatus* and from each other, though I realized that my material was scant. More material came in later, from the type and other localities, and I became distinctly doubtful of the validity of the separation. Sir George F. Hampson kept the



SMITH -- ANYTUS.

species distinct in his monographic work; but Mr. Dod who has collected many examples, asserted that he had both forms represented in his captures and claimed that there was one species only.

A series of 28 ♂ and 23 ♀ from De Clair, Man., secured through Mr. H. H. Brehme, added to what I had from other sources, gave me a series of 65 examples of the two forms and, at first sight, separation seemed hopeless. More careful sifting, however, made matters easier, and I finally sorted out 5 ♂ and 4 ♀ as *obscurus*, all from Calgary, and the remainder, from Brandon, Cartwright, Miniota and De Clair, Manitoba, were all *profundus*. *Obscurus* is really well named and in the male differs obviously from *profundus* in a distinct brownish tinge, in the lack of contrasts, especially in the s. t. space, in the much more even, powdery suffusion over the whole wing, and in the lack of definition to the median lines.

Two males of *obscurus* and six of *profundus* were examined for genital structure and six figures, showing all noted variations, were made and are reproduced here for comparison. The harpes are asymmetrical and there is some little difference in each case; but the two *obscurus* stand out against the four *profundus* in the shorter, broader tip. The left harpe at tip shows in all *profundus* the little finger-like process at outer side below the level of tip which rises at once from the incision, while in *obscurus* the finger extends beyond the level of the border next adjoining. The differences are slight and perhaps not important; but for the present the superficial and other characters lead me to hold the two species as distinct.

EXPLANATION OF PLATE 11.

1. *Anytus privatus*: New York specimen.
2. *Anytus teltowa*: New Jersey specimen.
3. *Anytus obscurus*: Calgary specimen.
4. *Anytus obscurus*: Calgary specimen.
5. *Anytus profundus*: Brandon, Manitoba.
6. *Anytus profundus*: De Clair, Manitoba.
7. *Anytus profundus*: Meiniota, Manitoba.
8. *Anytus profundus*: Cartwright, Manitoba.

SYNONYMICAL AND OTHER NOTES ON DIPTERA.

By W. R. Thompson.

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I.

In Vol. II, No. 4 of the "Annals of the Entomological Society of America," a number of species and genera of North American Tachinids are described as new by Mr. C. H. T. Townsend. While working in the National Museum some time ago, I had occasion to make a careful study of the types of some of these forms, with the results given herewith.

Paragermaria autumnalis Towns.

This species has been described by Mr. D. W. Coquillett in Proc. Ent. Soc. Wash., VI., p. 186, 1904, as *Distichona auriceps*. The species is a well-marked one and there can be no question as regards the specific synonymy. The question of the synonymy of the three genera Distichona v. d. Wulp, Pseudogermaria B. & B., and Mr. Townsend's new genus Paragermaria, is a more difficult one and I do not care to express an opinion upon it at the present time. It must be noted, however, that in the specimens of this species which I have examined, there are a couple of hairs below the lowest frontal bristles and a row of similar fine hairs extends up the parafacials to a short distance below the upper ones just mentioned so that the parafacials cannot be termed bare. On this account *Distichona auriceps* Coqt., will not run to the genus Distichona in either the key to the genera in Mr. Coquillett's "Revision," nor in Mr. Adams' in Williston's "Manual," but will run out to Winthemia, from which it is easily distinguished by the reclinate ocellar bristles, the ciliate facial ridges, the broad cheeks, etc.

Sisyropa hemerocampae Towns.

Mr. Townsend gives as a synonym of this species, *Exorista griseomicans* Coq. (*non* v. d. Wulp), but has apparently over-

looked the fact that what is apparently the same form has been described already by Mr. Coquillett in the "Revision of the Tachinidæ," pp. 97–98, as *Exorista amplexa*. An examination of the series of specimens referred by Mr. Coquillett in the "Revision," to *griseomicans* v. d. Wulp, of those described by him as *amplexa*, and of the specimens included by Mr. Townsend under *hemerocampæ*, has disclosed the fact that the number of post-sutural macrochætæ is variable within the species, many specimens having three post-suturals on one side and four on the other. No other differences between the three forms are perceptible and consequently they must be referred to one and the same species. It is doubtful if the species is the one described by van der Wulp in the Biologia as *griseomicans*. His description omits several of the important characters but the legs are described as "black" whereas in all of the specimens of this form which I have examined, the tibiæ and often the femora as well, are reddish-yellow. Until it can be positively determined by an examination of van der Wulp's type that the species are not distinct the synonomy must stand as follows:

Exorista amplexa Coqt.

1897. *E. amplexa* Coqt., in Revision of the Tachinidæ, pp. 97–98.
E. griseomicans Coqt. (*non* van der Wulp), loc. cit., p. 98.
1909. *Sisyropa hemerovampæ* Towns., in Ann. Am. Ent. Soc., Vol. II, no. 4, p. 248.

Mr. Townsend gives no reasons for referring the species to the genus Sisyropa and until such reasons are forthcoming it must remain in the genus Exorista.

Eumasicera coccidella Towns.

The type of this species, which is a single female from Massachusetts, agrees perfectly with types and co-types of *Sturmia sternalis* Coqt., described from Missouri, and the forms seem to be without doubt identical. The genus Eumasicera certainly cannot stand since the species runs to the genus Sturmia in Mr. Townsend's own key to the genus Argyrophylax and its allies, in the "Taxonomy of the Muscoidean Flies," p. 98.

Rileyella Towns.

This genus is proposed by Mr. Townsend to include a single species,—*Frontina aletiæ* Riley, and as I understand it, to separate this form from *Frontina frenchii* Will., and *F. archippivora* Will., both of which have marginal macrochætæ on the first two abdominal segments in both sexes. After a careful comparison of the characters afforded by the puparia, which it may be remarked, are frequently of great assistance in the study of the Tachinidæ, and of the adult characters, including those afforded by the genitalia of the males, I have come to the conclusion that there is no good reason for the generic separation of *aletiæ* and *frenchii*. In the "Taxonomy of the Muscoidean Flies," p. 88, Mr. Townsend himself included *aletiæ* in the same genus with *hesperus* B. and B. which Mr. Coquillett in his "Revision" gives as a synonym of *frenchii*.

Cordyligaster septentrionalis Towns.

This form, described by Mr. Townsend from specimens from Plummer's Island, Md., is evidently *C. minuscula* v. d. Wulp, which was described from various localities in Mexico. A long series of specimens of this species is in the U. S. N. M. collections, and a careful study of the series and comparison with the types and co-types of Mr. Townsend's species, failed to disclose any specific differences. The description given by Mr. Townsend differs very little from that given by van der Wulp in the Biologia Centrali Americana, and there can be no doubt as to the specific identity of the two forms.

In the "Taxonomy of the Muscoidean Flies," p. 80, Mr. Townsend has described a new genus and species, *Oedemasoma nuda*, from a male specimen collected in Nevada, and remarks upon its close resemblance to *Wahlbergia brevipennis* Loew, to which Mr. Coquillett had referred this specimen with a query. The only differences which Mr. Townsend was able to find were slight differences in the position of the hind cross-vein, in the length of the petiole of the apical cell, and in the distribution of the pollen on the head and thorax. Through the kindness of Mr. Samuel Henshaw, I have been able to examine Loew's type in the Museum of Comparative Zoology in Cambridge. To all appearances Loew's type is somewhat greased, which undoubtedly accounts for the absence of the slight silvery pruinosity on the parafrontals

and anterior part of the mesonotum which Mr. Townsend describes as present in *Oedemasoma nuda*. Loew's specimen is a female whereas Mr. Townsend's is a male. In view of these facts it seems scarcely reasonable to separate them specifically. At Mr. Coquillett's request I drew up a description of the type of *Wahlbergia brevipennis* Loew, and forwarded it to him for comparison with the type of *Oedemasoma nuda* Towns., and he has come to the conclusion that the differences in the sex of the two specimens and the greased condition of Loew's type were sufficient to account for the differences which exist between them. Mr. Coquillett considers that the generic reference to Wahlbergia was correct, so that the generic synonymy will stand as follows:

Besseria Desvoidy, 1830.
Wahlbergia Zetterstedt, 1842.
Apostrophas Loew, 1870.
Oedemasoma Townsend, 1908.

In the other questions of synonymy discussed above Mr. Coquillett substantially agrees with me, and I wish to express my gratitude to him for his kind and courteous assistance in this and many other matters.

II.

In the keys to the genera of the Sarcophagidæ and Muscidæ in Williston's "Manual" there exists a slight but misleading error to which it may be well to call attention. If I do not mistake, these keys are adapted from those drawn up by Brauer and v. Bergenstamm in "Die Zweiflügler des k. k. Museums zu Wien." As Mr. Townsend has already pointed out in his "Taxonomy," the "genæ" or "Wangen" of Brauer and v. Bergenstamm do not correspond to the "cheeks," as the latter term is commonly understood, and as it is used in the keys to the Tachinidæ and Dexiidæ in the "Manual," but correspond to the "sides of the face" or "parafacials." The differences between the genera Calliphora and Lucilia, and between Phormia and Protocalliphora, are not in the presence or absence of hairs on the cheeks but on the sides of the face. Therefore, on page 343 of Williston's "Manual," the words "sides of the face," or "parafacials" should be substituted for "cheeks," in lines 2, 5, 8 and 11, and the same correction should be made on page 351, lines 4, and 5.

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